



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,887	09/22/2003	Jurgen Musolf	844,004-302	3577
34263	7590	11/18/2004	EXAMINER	
O'MELVENY & MEYERS 114 PACIFICA, SUITE 100 IRVINE, CA 92618			TRINH, MICHAEL MANH	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,887

Applicant(s)

MUSOLF ET AL.

Examiner

Michael Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004 of IDS.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 10-15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/22/03 & 1/12/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 2822

DETAILED ACTION

*** This office action is in response to filing of the application on September 22, 2003.

Claims 1-15 are current pending.

Specification

1. Specification page 18 is objected to because line 14 and line 19 mention numeral reference "260", but drawing Figures 3F-3J do not show the numeral reference "260".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1,2,4,7 are rejected under 35 U.S.C. 102(e) as being anticipated by Fork et al (6,290,510).

Fork et al teach a method for fabricating an electrostatic actuator, comprising: forming an electrode 830-1,930-1 on a substrate 801 (Figs 8A-9, col 11, lines 26-65; and Figs 3A-3G, col 5, line 5 through col 7); forming a support layer 310/312 over the electrode 830-1/930-1 (Fig 8A, 3B); and depositing a metal layer 320/320-1/320-1F onto the support layer (Fig 8B), while varying deposition process conditions in order to induce a stress gradient into the metal layer (col 5, lines 34-40). Re claim 2, the method includes removing the support layer 310 to form a gap between the metal layer 320 and the electrode 830 (Fig 8C,9,3G; col 11, lines 26-65; col 6, line 66 through col 7, line 6). Re claim 4, wherein an anchor 312 (Figs 8C,9,3G; col 6, line 50 through col 7, line 12) is formed on the substrate, and wherein one end of the metal layer 320 is

Art Unit: 2822

deposited on the anchor 312. Re claim 7, wherein electroplating is also used to deposit the metal layer (col 9, lines 35-47; lines 19-46).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fork et al (6,290,510) taken with Bozler et al (5,233,459).

Fork et al teach a method for fabricating an electrostatic actuator as applied to claims 1,2,4,7 above.

Re claim 3, Fork teaches forming and removing a support release layer 510 to form a gap (Figs 5A-5G; col 8, lines 21-60), but do not teach the support layer of photoresist.

However, Bozler teaches (at Figs 1a-1j) to use photoresist material as a support release layer, wherein removing a support layer 16 of photoresist forms a gap between upper and lower electrodes.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the support layer of Fork by employing a release material of photoresist as taught by Bozler. This is because the substitution of photoresist material as art recognized alternative equivalent release material would have been within the level of one having the ordinary skill in the art, wherein photoresist material can be effectively removed from

Art Unit: 2822

the substrate in a selective and reliable manner with respect to other materials formed on the same substrate without damage so that a gap can be formed between the electrodes.

6. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fork et al (6,290,510) taken with Little (5,665,648).

Fork et al teach a method for fabricating an electrostatic actuator as applied to claims 1,2,4,7 above.

Re claims 5-6, Fork teaches varying process parameters to generate internal stress in the metal layer, but does not teach induce stress by increasing the deposition rate during deposition (claim 5) or lowering the deposition temperature during deposition (claim 6).

However, Little teaches (at Figs 3A-3B; col 3, lines 55-63; col 9, lines 9-31) inducing stress in a metal layer by varying deposition rate or deposition temperature, wherein tensile stress or compressive stress is induced by vary the deposition rate or deposition temperature of lower or higher during deposition, wherein a tensile stress is induced by increasing a deposition rate during deposition of a metal layer (col 9, lines 9-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to induce the stress gradient in the metal layer of Fork et al by varying deposition rate or deposition temperature during deposition, as taught by Little, wherein increasing deposition rate induces a tensile stress, wherein stress is induced in the metal layer by low or high deposition temperature. This is because of the desirability to induce a desired stress gradient in the metal layer in a control manner.

7. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fork et al (6,290,510) taken with Ohmura et al (4,401,521) and Joyce (6,238,539).

Fork et al teach a method for fabricating an electrostatic actuator as applied to claims 1,2,4,7 above.

Re claims 8-9, Fork teaches varying process parameters to generate internal stress and teaches electroplating to deposit the metal layer, but does not teach induce stress by increasing the current density during deposition (claim 8) or lowering the electroplate temperature during deposition (claim 9).

However, Ohmura teaches (at last 7 lines of the Abstract; col 3, lines 52-63; cols 3-4) electroplating to form a metal layer having stress by increasing the electroplate current density during deposition of the metal layer. Joyce teaches that variation of electroplating temperature and current density induce a stress in a metal layer (col 4, lines 35-43; col 5, lines 45-50, col 6, lines 5-15; col 6, lines 61-64), wherein the stress can be either tensile or compressive stress (abstract), wherein stress is induced by lowering temperature (col 6, lines 61-68), wherein stress is induced by increasing current density (col 6, lines 20-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to induce the stress gradient in the metal layer of Fork et al by varying current density or deposition temperature during deposition, wherein increasing current density and lowering temperature induce a stress in the metal layer, as taught by Ohmura and Joyce, This is because of the desirability to induce a desired stress gradient in the metal layer in a control manner.

Allowable Subject Matter

8. Claims 10-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

The references of record, alone or in combination, do not anticipatively disclose each and every aspect of the claimed method for fabricating an electrostatic actuator, or fairly make a prima facie obvious case of the claimed method, in combination with other processing claimed limitations as recited in base claim 1, with the inclusion of inducing a stress gradient in the metal layer as in claim 10 by depositing the metal layer by depositing a soft metal; and depositing a hard metal onto the deposited soft metal layer, wherein the deposited soft metal and the deposited hard metal are made substantially of the same metal characterized by different crystal grain sizes and the deposited hard metal exhibits a higher intrinsic stress than the deposited soft metal.

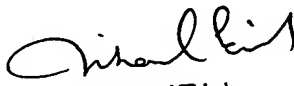
Art Unit: 2822

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs-01


Michael Trinh
Primary Examiner